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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/780,585

02/19/2004

Yasuo Osone

500.43521X00

2494

20457 7590 10/09/2008
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EXAMINER

SINCLAIR, DAVID M

ART UNIT

PAPER NUMBER

2831

MAIL DATE

DELIVERY MODE

10/09/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/780,585	Applicant(s) OSONE ET AL.	
	Examiner DAVID M. SINCLAIR	Art Unit 2831	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 6-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>02/19/2004 & 04/17/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claims 6-15 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 08/21/2008.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1 & 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl et al. (2003/0218514) in view of Kuo et al. (2004/0016995).

Eckl '514 disclose a variable capacitor system comprising a substrate ([0043] – wafer); a variable capacitor (C3 – fig. 1; [0033]) including a driving mechanism for varying capacitance stored by a pair of electrodes ([0021] & [0050] – MEMS capacitor and changing distance between plates (pair of electrodes) implies a driving mechanism); a plurality of fixed capacitors (C1 & C2 – fig. 1; [0033]) having fixed capacitance stored by a plurality of pairs of electrodes ([0050] – comb-like structure); wiring means for electrically connecting said variable capacitor and said fixed capacitors (rf-port1 wire – fig. 1); and a switch (1_{C1}, 1_{C2}, 1_{C3}) to electrically connect said variable capacitor and a capacitor or capacitors selected from said plurality of fixed capacitors (fig. 1; [0003]). Eckl '514 fails to disclose the variable capacitor formed in a main surface of said substrate; the plurality of fixed capacitors formed in an opposite side of said main surface; and the switch disposed in said main surface of said substrate.

Kuo '995 discloses a MEMS device (610 – fig. 6; [0102]) formed in a main surface (fig. 6) and a control chip element (600) formed in an opposite side of said main surface (fig. 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize both sides of the substrate of Eckl '514 as taught by Kuo '995 and thus form the MEMS switch and MEMS varactor on a main surface of the substrate (movable/active components on a single side) and form the fixed capacitor(s) (non-movable/passive components) in an opposite side of the main surface to reduce the footprint of the variable capacitor system.

In regards to claim 3,

The references as applied above discloses all the limitations of claim 3 except said variable capacitor and said fixed capacitors are formed electrically in parallel, total capacitance of said fixed capacitors is larger than maximum capacitance of said variable capacitor, and said switch controls the number of said fixed capacitors connected electrically. However, Eckl '541 further discloses said variable capacitor and said fixed capacitors are formed electrically in parallel (fig. 1), and said switch controls the number of said fixed capacitors connected electrically (fig. 1). Eckl '541 discloses the claimed invention except for the total capacitance of said fixed capacitors is larger than maximum capacitance of said variable capacitor. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the total capacitance of said fixed capacitors larger than a maximum capacitance of said variable capacitor to increase the range of possible capacitance values obtainable by the variable

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capacitor system, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl '514 and Kuo '995 as applied to claim 1 above, and further in view of Sun et al. (6,307,169).

In regards to claim 2,

The references as applied above disclose all the limitations of claim 2 except said variable capacitor includes first and second electrode layers formed on said main surface of said substrate with space therebetween and a driving mechanism for controlling said space between said first and second electrode layers; and said switch includes first and second wiring layers formed on said main surface of said substrate with space therebetween, a beam supported to said substrate and having a conductive junction, and a driving mechanism for bring said junction into electrical contact with said first or second wiring layer.

However, Eckl '514 further discloses said variable capacitor includes first and second electrode layers formed on said main surface of said substrate with space therebetween and a driving mechanism for controlling said space between said first and second electrode layers ([0050] – two electrodes (first and second) distance between said electrodes change – implies a driving mechanism).

Eckl'514 fails to disclose said switch includes first and second wiring layers formed on said main surface of said substrate with space therebetween, a beam

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supported to said substrate and having a conductive junction, and a driving mechanism for bring said junction into electrical contact with said first or second wiring layer.

Sun '169 discloses a MEMS switch (100 – fig. 1-2; column 3 – lines 3-4) includes first (102 – fig. 1-2; column 3 – lines 5-6) and second (103 – fig. 1-2; column 3 – lines 5-6) wiring layers formed on said main surface of said substrate (101 – fig. 1-2; column 3 – line 7) with space therebetween (fig. 2), a beam (104 – fig. 1-2; column 3 – line 24) supported to said substrate and having a conductive junction (106 – fig. 1-2; column 6 - lines 23-24), and a driving mechanism for bring said junction into electrical contact with said first or second wiring layer (fig. 3; column 5 – lines 1-17).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the MEMS switch taught by Sun '169 as the MEMS switch of the variable capacitor system of Eckl '514 to obtain a variable capacitor system comprising a MEMS switch with increased reliability, reduced stiction, and higher switching speed.

7. Claims 1, 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl et al. (2004/0147237) in view of Kuo '995.

In regards to claim 1,

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Eckl '237 disclose a variable capacitor system comprising a substrate ([0053] - wafer); a variable capacitor (C_1 – fig. 1; [0037]) including a driving mechanism for varying capacitance stored by a pair of electrodes ([0037-0038] & [0062]); a plurality of fixed capacitors (C_2 – fig. 1; [0037]) having fixed capacitance stored by a plurality of pairs of electrodes; wiring means for electrically connecting said variable capacitor and said fixed capacitors (rf-port2 wire – fig. 1); and a switch (S_{C2}) to electrically connect said variable capacitor and a capacitor or capacitors selected from said plurality of fixed capacitors (fig. 1; [0037]). Eckl '237 fails to disclose the variable capacitor formed in a main surface of said substrate; the plurality of fixed capacitors formed in an opposite side of said main surface; and the switch disposed in said main surface of said substrate.

Kuo '995 discloses a MEMS device (610 – fig. 6; [0102]) formed in a main surface (fig. 6) and a control chip element (600) formed in an opposite side of said main surface (fig. 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize both sides of the substrate of Eckl '237 as taught by Kuo '995 and thus form the MEMS switch and MEMS varactor on a main surface of the substrate (movable/active components on a single side) and form the fixed capacitor(s) (non-movable/passive components) in an opposite side of the main surface to reduce the footprint of the variable capacitor system.

In regards to claim 3,

The references as applied above discloses all the limitations of claim 3 except said variable capacitor and said fixed capacitors are formed electrically in parallel, total capacitance of said fixed capacitors is larger than maximum capacitance of said variable capacitor, and said switch controls the number of said fixed capacitors connected electrically. However, Eckl '237 further discloses said variable capacitor and said fixed capacitors are formed electrically in parallel (fig. 1), total capacitance of said fixed capacitors is larger than maximum capacitance of said variable capacitor ([0042]), and said switch controls the number of said fixed capacitors connected electrically ([0039]).

In regards to claim 4,

The references as applied above discloses all the limitations of claim 4 except an interval of total fixed capacitance varied when total capacitance of said fixed capacitors connected to a circuit electrically by said switch is varied is smaller than a variable capacitance range of said variable capacitor. However, Eckl '237 further discloses an interval of total fixed capacitance varied when total capacitance of said fixed capacitors connected to a circuit electrically by said switch is varied is smaller than a variable capacitance range of said variable capacitor ([0042]).

In regards to claim 5,

The references as applied above discloses all the limitations of claim 5 except an interval of total fixed capacitance varied when total capacitance of said fixed capacitors connected to a circuit electrically by said switch is varied is larger than a variable capacitance range of said variable capacitor. However, Eckl '237 further discloses an interval of total fixed capacitance varied when total capacitance of said fixed capacitors connected to a circuit electrically by said switch is varied is larger than a variable capacitance range of said variable capacitor ([0042]).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

USPGPUB 2002/0135428 discloses a plurality of fixed capacitors connected in parallel with a varactor via switches.

USPAT 7,155,182

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID M. SINCLAIR whose telephone number is (571)270-5068. The examiner can normally be reached on Mon - Thurs. 8-4.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego F. Gutierrez can be reached on (571) 272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Diego Gutierrez/
Supervisory Patent Examiner, Art Unit 2831

/D. M. S./
Examiner, Art Unit 2831